

## Claims

1. A charged particle beam system including a main chamber, an exchange chamber and a substrate handling device mounted inside the main chamber for  
5 loading and unloading a substrate into and out of the main chamber, the device comprising a bar and a side member extending laterally from the bar for supporting the substrate to one side of the bar and means for translating the bar along its longitudinal axis and configured such that the side member is moveable into and out of the exchange chamber.  
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2. A system according to claim 1, wherein the means for translating the bar includes a rail protruding from the bar.
3. A system according to claim 2, wherein the rail runs along the bar.  
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4. A system according to claim 2 or 3, wherein the means for translating the bar further includes a set of linear bearings for holding the rail.
5. A system according to any preceding claim, wherein the bar is cogged to  
20 provide a rack.
6. A system according to claim 5, wherein the means for translating the bar further includes a pinion arranged to engage the rack.
- 25 7. A system according to claim 6, wherein the pinion is directly coupled to a motor.
8. A system according to any preceding claim, wherein the device further comprises means for supporting the bar.  
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9. A system according to claim 8, wherein the means for translating the bar includes a rail protruding from the bar and the means for supporting the bar includes a set of linear bearings for holding the rail.

10. A system according to claim 8 or 9, wherein the bar is cogged to provide a rack and the means for supporting the bar includes a pinion arranged to engage the rack.

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11. A system according to any preceding claim, further comprising means for translating the bar along a transverse axis.

12. A system according to claim 11, wherein said means for translating the bar  
10 along a transverse axis comprises means for raising and lowering said bar.

13. A system according to any preceding claim, wherein the side member is in the form of a cantilevered wing.

15 14. A system according to any preceding claim, wherein the device is mounted to an inside wall of a chamber.

15. A system according to any preceding claim, wherein the device is configured to project the bar and the side member through an aperture in a wall of the main  
20 chamber.

16. A system according to any preceding claim, wherein the bar is substantially horizontal.

25 17. A system according to any preceding claim, configured to cooperate with a cassette having a plurality of shelves.

18. A system according to any preceding claim, configured to cooperate with a cassette having at least one shelf, said shelf having a ledge around a space, said  
30 device configured to permit said side member to pass through said space when said side member is raised or lowered so as to permit a substrate to be deposited on or picked up from said shelf.

19. A system according to any preceding claim, wherein said substrate is supported by a substrate support and said side member is configured to support said substrate support.
- 5 20. A system according to any one of claims 1 to 19, wherein said substrate is a workpiece.
21. A system according to any one of claims 1 to 20, wherein said substrate is a wafer.
- 10 22. A system according to any one of claims 1 to 20, wherein said substrate is a wafer chip.
- 15 23. A system according to claim 21 or 22, wherein said substrate includes at least one layer overlying a base.
24. A system according to claim 23, wherein said substrate includes at least two layers, a first layer overlying a base and a second layer overlying the first layer.
- 20 25. A system according to claim 23 or 24, wherein said one layer is an epitaxial layer.
26. A system according to claim 21 or 22, wherein said substrate is patterned.
- 25 27. A system according to any one of claims 1 to 20, wherein said substrate is a mask blank.
28. A system according to any preceding claim, wherein a surface of said substrate is coated with a resist layer.
- 30 29. A system according to any one of claims 1 to 20, wherein said substrate is a specimen.

30. A system according to any preceding claim, further comprising a cassette for holding a plurality of wafers.

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31. A system according to claim 30, wherein said cassette comprises a plurality of shelves.

32. A system according to claim 31, wherein each shelf is configured to provide  
10 a ledge around a space through which the side member can pass when being raised or lowered through the plane of the shelf.

33. A system according to claim 31 or 32, wherein a portion of an inner  
15 periphery of each shelf has a complementary shape to a portion of an outer periphery of said side member.

34. A system according to any preceding claim, wherein wafers are supported by respective wafer supports.

20 35. A system according to any preceding claim, wherein in a first position, the device is contained within the chamber.

36. A system according to any preceding claim, further comprising means for  
evacuating said chamber.

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37. A system according to any preceding claim, further comprising means for controlling an environment within said chamber.

38. A substrate handling device for a charged particle beam system, the device  
30 comprising a bar and a side member extending laterally from the bar for supporting a substrate to one side of the bar and means for slidably moving the bar along its longitudinal axis.

39. A substrate handling device for a charged particle beam system, the device comprising a bar and a side member extending laterally from the bar for supporting a substrate to one side of the bar, the bar being configured to translate along its longitudinal axis.

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40. A method of handling a substrate in a charged particle beam system using a device comprising a bar and a side member extending laterally from the bar for supporting a substrate to one side of the bar and means for translating the bar along its longitudinal axis, the method comprising:

10 translating the bar along its longitudinal axis.

41. A method according to claim 40, further comprising:  
raising said bar so as to cause a substrate to be picked up.

15 42. A method according to claim 40 or 41, further comprising:  
lowering said bar so as to cause a substrate to be placed down.

43. A substrate handling device for a charged particle beam system, the device comprising:

20 a bar and a side member extending laterally from the bar for supporting a substrate to one side of the bar; and  
means for translating the bar along its longitudinal axis.